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ORIGINAL ARTICLES.

SHORT-DURATION TYPHOID FEVER.[1]

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The term short-duration typhoid fever is used to include the types of the disease which have been designated ambulatory, abortive, mild, typhus lævis, and typhus lævissimus. These types are not well defined, and it seems desirable to have a term which not only will include them all, but at the same time will point out the very important fact that many cases of typhoid fever do not run the classical twenty-one day course. The mild and ambulatory cases come within the meaning of the term only when they last less than three weeks.

Every year during the typhoid season a limited number of patients enter the second medical division of Bellevue Hospital suffering from a mild febrile disease, without obvious cause, which completes its course in periods varying from about one to about two weeks. During the first years of my service at the hospital, in accordance with accepted beliefs, I regarded these cases as examples of febricula or simple continued fever. In 1901, however, when I undertook with Buxton to study the bacteriology of the blood in typhoid fever, I began to question the correctness of this diagnosis. About this time the paratyphoid infections attracted the attention of numerous investigators in Europe and in this country, and the claim was made by several writers that the paratyphoid could be distinguished clinically from the typhoid cases by their milder and shorter course. With the double purpose of testing this claim and of determining the true nature of the disease or diseases in question, we made bacteriological examinations of the blood of all patients who might be suffering from typhoid fever. The recovery of the typhoid bacillus in pure culture from the blood of several of these cases convinced me that the whole question of the occurrence and diagnosis of the irregular forms of typhoid fever might be profitably investigated.

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[1] Read at a meeting of the New York State Medical Society, Albany, January 26, 1909.

REVIEW OF THE LITERATURE. Though typhoid fever has been known as a distinct disease for nearly a century, a review of the literature reveals an astonishing state of confusion concerning the very existence of the milder and shorter forms. The history of the diagnosis of typhoid fever falls readily into two periods: (1) The period before the introduction of exact methods of diagnosis; and (2) the period since the application of the Gruber reaction by Widal to the diagnosis of typhoid fever and the general employment of bacteriological methods in the diagnosis of the disease.

First Period. While the diagnosis of a typical case of typhoid fever ordinarily presents no difficulty, supposedly typical cases have occasionally turned out to be acute general tuberculosis. There is no clinical means by which the diagnosis of typhoid fever can be positively established. Therefore the diagnosis of the disease in this period was necessarily a matter of opinion. In a disputed case the diagnosis could not be proved or disproved unless some typical or fatal complication developed and the case came to autopsy. Ordinarily the "weight of authority" prevailed in doubtful cases.

The fact that mild forms of typhoid fever did occur, however, was known very early in the history of the disease. Louis[2] saw a case of ambulatory typhoid which perforated and came to autopsy. These forms were described by Wegelin[3] in 1854, by Griesinger[4] in 1864, by Murchison[5] in 1873, and by Liebermeister[6] in 1874. In 1873 Jurgensen[7] said that the whole theory of infective diseases is untenable if the existence of milder forms cannot be shown; that transitions from the mildest to the severest must be demonstrated.

Yet during the same period there grew up an extensive literature on mild fevers which were not generally, at least, considered to be typhoid and upon which a variety of names were bestowed. Some of these names may be cited: febricula, simple continued fever, mountain fever, "New York fever," embarrass gastrique febrile, fièvre bilieuse simple ou inflammatoire, gastrisches Fieber, and febris gastrica. Fortunately, these names have given place largely to

[2] Recherches sur la maladie fièvre typhoide, Paris, 1841.

[3] Zurich Thesis, 1854 (quoted from Briggs; original not available).

[4] Infktskrankh., 1864.

[5] A treatise on the continued fevers of Great Britian; London, 1873.

[6] Ziemssen, Path. u. Ther., 1874, vol. ii, Acute Infktskrankh.

[7] Volkmann's Samml. klin. Vortr, 1870, i to xxxiv; Inn. Med., No. 21, p. 477.

more exact diagnoses. But for many years it was claimed by English army surgeons that there was no typhoid fever in India. As late as 1897, the late Sir Joseph Fayrer[8] stated that "enteric fever occurs in India as it does in Europe, and most probably has always existed there. It may have been confounded with continued or remittent malarial fever, but it is not by any means certain that a febrile condition accompanied by diarrhœa, Peyerian ulceration, and an abdominal eruption is necessarily caused by the one specific contagium to which it is attributed in Europe." (At the time this was written the paratyphoid infections had not been studied). In the same article the fever morbidity returns for 1892 of the European and native armies in India, numbering nearly 200,000 men, are given: they were 1563 cases of typhoid fever, 96,226 cases of intermittent, 2660 of remittent, and 5618 *cases of simple continued fever.*

Likewise, for many years it was denied by the French army surgeons that typhoid fever existed in Algeria, but Scherb[9] states that typhoid is more common in Algeria than in Paris. Denis[10] says that typhoid fever in the corps in Algeria is almost as great as in the whole army in France.

It is true that the existence of these fevers as distinct diseases was called into question from time to time. Bäumler[11] said in 1867 that the earlier German idea that there existed a "febrile gastric catarrh" as a distinct and not uncommon disease, which in fully developed form was considered "gastric fever," had been gradually abandoned in favor of the belief that it was typhoid fever. Levy[12] in 1886, and Chantemesse[13] and Courtet[14] in 1889, expressed the opinion that embarrass gastrique febrile was a mild form of typhoid fever.

Undoubtedly one reason for the reluctance of the medical profession to accept, during this period, the belief that the milder forms of typhoid fever occurred frequently was the weight of Wunderlich's[15] dictum, issued in 1868, to the effect that a case of fever, without obvious cause, was certainly not typhoid unless the temperature reached 103.2° between the fourth and sixth days. In the absence of exact methods of diagnosis, one might doubt but not disprove the truth of this dictum. As late as 1897, Dreschfeld[16] referred to it as still possessing value in diagnosis.

Second Period. The second period opens with the announcement by Widal[17] of his application of the Gruber reaction to the diagnosis of typhoid fever. Strange as it may seem, when one considers the epidemiological importance of the subject, the study of the milder forms of typhoid fever, with the aid of exact methods of diagnosis, has been greatly neglected.

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[8] Allbutt's System, article on the Climate and Some of the Fevers of India, vol. iii.

[9] Bull. méd. d'Algerie, 1903, 2s, I, 33.

[10] Discussion of Scherb's paper.

[11] Deut. Arch. f. klin. Med., 1867, iii, 278.

[12] Thèse Montpellier, 1886, Embarrass gastrique febrile.

[13] Sem. méd., 1889, ix, 421.

[14] Thèse de Paris, 1889, Embarrass gastrique febrile et typhoide fièvre.

[15] Das Verhalten der Eigenwarme in Krankheiten, Leipsic, 1868.

[16] Allbutt and Rolleston's System, article Typhoid Fever.

[17] Soc. méd. d. hôp. d. Paris, 1896, 3s, xiii, 561.

Shortly after the appearance of Widal's paper it was demonstrated in France and Tunis by Lemoine,[18] Catrin,[19] Geraud and Remlinger,[20] and Roux[21] that serum from cases of embarrass gastrique febrile gave the typhoid reaction. Woodruff[22] showed that this was also true for mountain fever in this country. (It may be stated parenthetically that these results would not be accepted today because the methods of performing the tests have since been shown to be unreliable. Yet these investigations marked a definite advance in the study of typhoid fever.)

In 1904, during the typhoid epidemic in and around Saarbrück, Koch and his co-workers established the typhoid nature of many mild febrile cases of indefinite clinical character. For example, Drigalski[23] obtained a positive typhoid reaction 306 times and recovered the typhoid bacillus from the stools 75 times in 381 doubtful cases. Frosch,[24] by the employment of the same methods, discovered 144 cases of typhoid fever in a region where only 8 had been officially reported.

J. P. Bates has published the results of a study of 68 cases of typhoid fever in Panama.[25] Twenty-one (32 per cent.) of the cases were of the short-duration variety. The typhoid bacillus or a paracolon bacillus was recovered from the blood in 9 of these cases; in the 12 remaining cases the diagnosis was based upon the serum reaction. A paracolon bacillus was found in the blood of the case of shortest duration (eight days).

Except for the reports by Debrie[26] and Briggs[27] these are the only papers I have been able to find in which the attempt is made to prove that the milder forms of typhoid fever have often been concealed under the names simple continued fever, mountain fever, etc. A number of papers have been written in which the authors express the belief that short-duration typhoid fever is of common occurrence and often overlooked, but they either offer no proof or relate only one or two cases.

No paper has yet been published on the bacteriology of the blood in the milder forms of typhoid fever. Buxton and I[28] analzyed the reports of 1602 cases whose blood had been examined bacteriologically, and the only reference we found to the subject was a brief paragraph by Conradi[29] stating that he had recovered the typhoid bacillus twice from the blood of cases lasting about eight days each.

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[18] Soc. méd. d. hôp. d. Paris, 3s, xiii, 669.

[19] Ibid., 1896, 3s., xiii, 698.

[20] Arch. d. méd. et pharm. mil., 1897, xxx, 313.

[21] Ibid., 1898, xxxii, 102.

[22] Jour. Amer. Med. Assoc., 1898, xxx, 753.

[23] Centralbl. f. Bakt., 1903–04, xxxv, 1 Abt., 776.

[24] Quoted by Talayrach, Arch. d. méd. et pharm. mil., 1903, xlii, 393 (unable to find original reference).

[25] Jour. Amer. Med. Assoc., 1909, lii, 1903.

[26] Arch. de la Direction du service de santé du XIV Corps d'Armée, 1902.

[27] Amer. Med., 1904, viii, 639.

[28] AMER. JOUR. MED. SCI., 1907, cxxxiii, 896.

THE BELLEVUE HOSPITAL CASES. We do not see many of the milder forms of any disease in Bellevue Hospital. Nevertheless, in the last five years, exclusive of 1908, 10 per cent. of 229 cases of typhoid fever on the second medical division have been of the short-duration variety. The proportion of mild to severe cases has varied in different years: thus, in 1903 there were only 2 mild cases; in 1904, 11 cases (constituting for that year 25 per cent. of the typhoids); in 1905, 4 cases; in 1906, 5 cases; and in 1907, 2 cases. The febrile period in 9 of the 24 cases lasted about two weeks, in 9 it lasted ten days, in 4 it lasted nine days, and in 2 cases it lasted five and six days respectively. One of the two cases which occurred in 1903, and which lasted nine days, gave Bacillus coli in pure culture in the blood, but I think it may with propriety be included here.[30] The diagnosis in 20 of the 24 cases is not open to doubt, since it rests either upon a positive serum reaction or upon a positive blood culture. In the remaining 4 cases the diagnosis was made upon clinical evidence, it having been impossible for various reasons to study the cases thoroughly, and it therefore is doubtful.

The serum reaction was negative in 6 cases of the series, but in 2 of these the typhoid bacillus was obtained in pure culture from the blood. In 3 of the negative cases blood cultures were not made. In the remaining negative case a blood culture in broth was also negative.

Blood cultures were taken in 19 of the 24 cases, with a positive result 9 times and a negative result 10 times. In one of the negative cases the blood was not taken until after the temperature had reached normal, and according to our present experience would not be expected to contain the bacilli. The bacillus was not found in the blood in any case of less than nine days' duration. Conradi's bile medium was used in only two of the negative cases, the other negative cases having been studied before this medium was recommended. As we have had about 97 per cent. of positive results with the bile medium in all varieties of typhoid fever, and have been much less successful with broth, we do not feel that the negative cases in which broth was used are entirely reliable.

Symptomatology. The symptoms of short-duration typhoid fever have been so well described by several authors, notably Curschmann,[31] that I shall not discuss them. The temperature curves (Figs. 1, 2, and 3) will show in a general way the course of several of the Bellevue cases.

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[29] Deut. med. Woch., 1906, xxxii, 58.

[30] AMER. JOUR. MED. SCI., 1909, cxxxvii, 199.

[31] Nothnagel's Encyclopedia, Typhoid fever.

Diagnosis. If one may judge of the attitude of the medical profession toward short-duration typhoid fever from current literature and text-books, the conclusion must inevitably be reached that these cases are not often recognized.

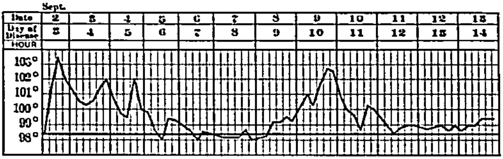

FIG. 1.—Herman R., typhoid fever of seven days' duration, with relapse; positive typhoid serum reaction; blood culture negative.

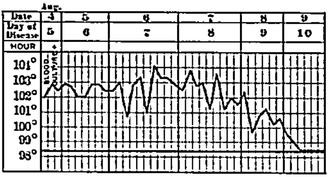

FIG. 2.—Terence B., typhoid fever of ten days' duration; typhoid bacillus obtained from the blood.

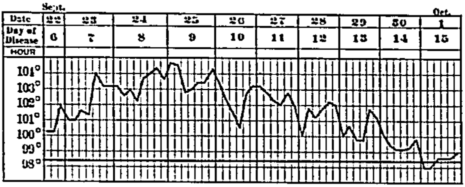

FIG. 3.—Dennis C., typhoid fever of fourteen days' duration; typhoid bacillus obtained from the blood.

Reed, Vaughan, and Shakespeare[32] state their belief "that the number of cases of typhoid fever among the troops of the —— and —— Army Corps was more than twice the number recognized as having that disease." And after a discussion of the mortality statistics of typhoid fever in several of the larger cities of the country, they say:[33] "We are forced to conclude that in these cities a large percentage of the cases of this disease are not recognized as typhoid fever. The army surgeon did in his military service just as he was in the habit of doing in his civil practice, *i. e.*, he failed to properly diagnosticate the milder cases of typhoid fever. His military record is no worse and no better than was his own record in civil practice or is the record of physicians in some of the largest cities of the United States." The sweeping character of this indictment is startling, but the review of the literature forces the admission that it is not overdrawn. Moreover, this review also shows that the failure to recognize the shorter forms of typhoid fever has not been confined to any one country, but has been worldwide.

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[32] Report of the Commission appointed by the President to investigate the conduct of the War Department in the war with Spain. Washington, 1899, pp. 59, 61.

Lafforgue[34] says of short-duration typhoid fever: "The true nature of these forms is not often recognized. They constitute one of the most formidable sources of infection."

Turning to the standard text-books, it is found that all of them contain descriptions of the classical case of typhoid fever, with the usual division of the disease into three periods of a week each. Most of them speak of the abortive cases which begin as the longer cases do. Only one of the American text-books gives more than a passing notice to cases which last less than two weeks. Curschmann gives a classical description of these cases, while Dreschfeld says of them only that during epidemics of typhoid fever, when many mild and abortive cases are about, the differential diagnosis from acute gastrointestinal catarrh may present great difficulty—and leaves the means of overcoming the difficulty to the reader's imagination. The strongest impression conveyed by the text-books is that typhoid fever is a disease of three weeks' duration.

As a final quotation, bearing upon the diagnosis of short-duration typhoid fever, I may cite the title of a paper, by an experienced physician, which appeared in February, 1908. His title is the question, "Is there such a disease as abortive typhoid?" The author believes that there is, but adduces no proof.

When one considers the state of confusion which still exists, according to the published opinions of the leaders of the medical profession, concerning the milder forms of typhoid fever, and also the fact that the study of these cases with the aid of the newer laboratory methods has been largely neglected, it is not surprising that practical physicians should hesitate to make the diagnosis of typhoid fever in a case which shows few of the classical symptoms of the disease and which completes its course in two weeks or less. In a recent conversation with a progressive physician from a town of about 12,000 inhabitants, he said he would be disposed to think he had made a mistake in diagnosis if a supposed case of typhoid fever lasted less than two weeks.

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[33] Ibid., page 61.

[34] Arch. gén. d. méd., 1905, ii, 2625, 2635.

But the diagnosis of these cases may easily be made in general practice. It cannot be made clinically except in the presence of some typical complication; one must have recourse to laboratory methods. With dead cultures of the typhoid bacillus, which may be obtained in the market, the serum test may be carried out by any busy practitioner.

Serum Reaction. The fact is well known that a patient's serum may give a positive reaction to the typhoid bacillus when the patient is not suffering from typhoid fever. A positive typhoid reaction means only that the bacillus is growing in the body, and that immune bodies (agglutinins) are forming. Cases of typhoid infection of the biliary passages and typhoid bacillus carriers furnish examples. But if a positive reaction appears transiently during the course of a febrile attack, which is not obviously due to some other cause, the diagnosis of typhoid fever is reasonably certain. It need scarcely be added that to be of value the serum tests must be carefully performed and properly controlled.

The sera of cases of infection by the intermediate members of the typhoid-colon group (the paratyphoid and paracolon bacilli) and by Bacillus coli react only exceptionally to the typhoid bacillus, and should be tested against these organisms. So far as is known at present, however, cases caused by these bacilli constitute but a small proportion of the total typhoids, and except in special instances may be left out of consideration. But it must not be forgotten that epidemics of typhoid fever have been caused by the paratyphoid bacilli (Friedel,[35] Lempke, Schottelius,[36] Kutscher[37]).

Negative serum reactions possess no diagnostic value unless they are obtained daily throughout the febrile period of the disease and well into convalescence. In some of the Bellevue Hospital cases agglutinins were present in the blood for only one or two days, and if the reactions had not been tested on those days the results might have been considered negative throughout.

Bacteriological Examination of the Blood. Bacteriological examinations of the blood cannot be made unless one has access to a well-equipped laboratory, and therefore will not be of much assistance in diagnosis to the general practitioner. However, the method has served the useful purpose of setting at rest all doubt concerning the occurrence of short-duration typhoid fever. According to our experience at Bellevue, the typhoid bacillus is not found in the blood as uniformly in the short-duration cases as in the longer and severer forms of the disease. In several instances as many as three examinations of the blood gave negative results. Positive bacteriological examinations of the stools and urine do not necessarily prove that the patients have or have had typhoid fever. Brown[38] has reported a case of cystitis, caused by the typhoid bacillus, in a patient without a history of typhoid fever. And bacilli of the typhoid-colon group are not infrequently found in the stools of healthy persons —witness the bacillus carriers.

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[35] Zschr. f. Med-Beamte, 1905, xviii, 306.

[36] Münch. med. Woch., 1905, lii, 2116.

[37] Ztschr. f. Hyg. u. Infktskrankh, 1906, lv, 331.

In conclusion, I would say: This study has proved in an incontestible manner that some, at least, of the fevers which formerly would have been considered febricula or simple continued fever are in reality typhoid fever. In the present state of our knowledge it would be rash to assert that all mild fevers in this latitude, for which no other cause can be found, are typhoid in nature, but I can state that we have had no series of cases of mild fevers in Bellevue Hospital in the last five years which could not be proved to be either typhoid fever or some easily recognized disease, as bronchitis, gastro-intestinal disturbance, etc.

This investigation has also brought out the fact that a great deal of confusion exists in the literature concerning the milder forms of typhoid fever, and emphasizes the urgent need, from the epidemiological standpoint, of a more thorough study of these forms. No statistics have been accumulated, since exact methods of diagnosis have come into general use, to show the relative proportion of the mild to the severe cases of typhoid fever. Doubtful cases should be treated as typhoid fever until the cause of the disease can be found.

I would suggest that unless the writers of text-books on medicine, from which students are taught and to which practitioners turn when in doubt, devote more attention to the consideration of the milder forms of typhoid fever, they cannot hope to escape responsibility for a large share of blame for the occurrence of epidemics arising from this source.

Finally, I wish to express my indebtedness and my thanks to Dr. Buxton for making the blood cultures and to Dr. Hastings for performing the serum tests.

HEART FAILURE IN INFECTIOUS DISEASES: ITS PREVENTION AND SUCCESSFUL MANAGEMENT.

By W. Parker Worster, A.M., M.D.,
OF NEW YORK.

Thoroughly to understand the management of infectious fever it is necessary that we understand what is blood pressure, the cause of its enfeebleness, and the proper method to be adopted for its

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[38] Johns Hopkins Hosp. Rep., 1901–02, x, 11.